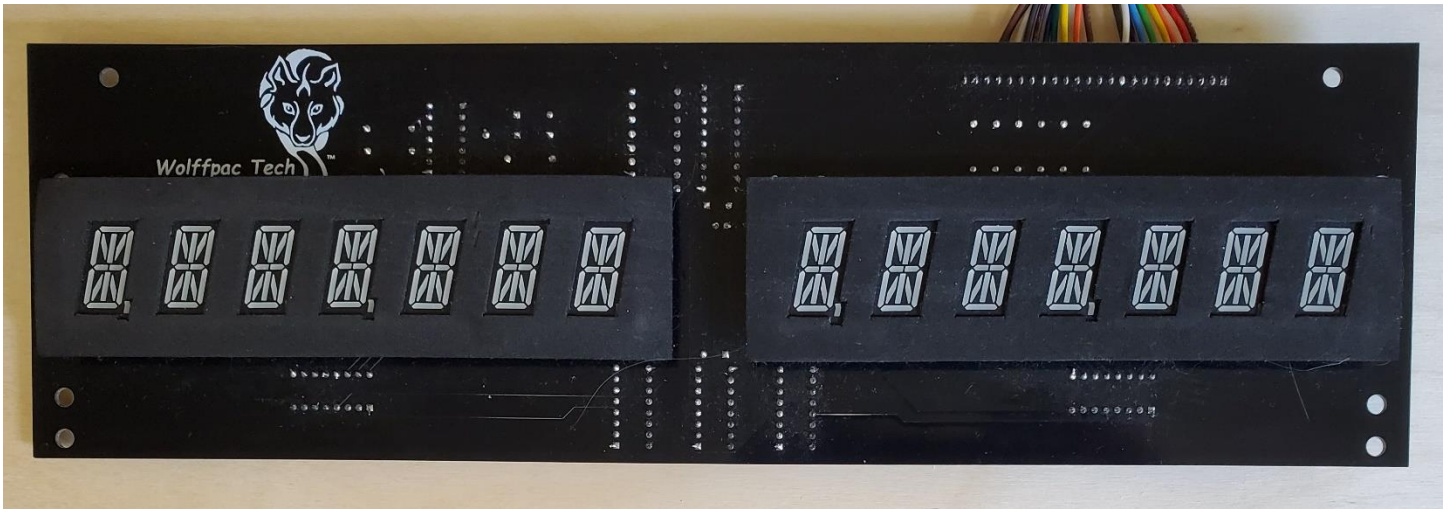
Wolffpac Technologies

Bally™ System 6803 Dual Display Replacement Display Kit



Assembly Instructions

wolffpactech.com

Rev. 5

When assembled, this display will replace the displays used on many Bally solid state pinball machines which use the "Dual Display". For the complete list of compatible machines, see the list at the end of these instructions.

Tools:

Soldering iron - A small to medium power soldering iron of 25-50 watts with a small tip, preferably temperature controlled, is recommended.

Wire cutters - A set of diagonal or wire cutters intended for cutting electronic component leads.

Alcohol –Isopropyl Alcohol, Denatured Alcohol or Flux Remover to be used for cleaning the board after assembly.

Solder - Use only solder designated for electronic component assembly. Either lead-based or lead-free flux-core solder are both acceptable.

→ Use of solid core, acid core or plumbing solder is not acceptable and will void the warranty. ←

All soldering, except LEDs, should be done on the bottom (non-printed) side of the boards. This kit uses "old school" through-hole components requiring only basic soldering skills to assemble. However, if you have never soldered before or are unsure of your skill level, it is recommended that you first practice soldering on a scrap board before beginning to assemble this kit. There are many references on the internet which can help you learn how.

Caution - Warning

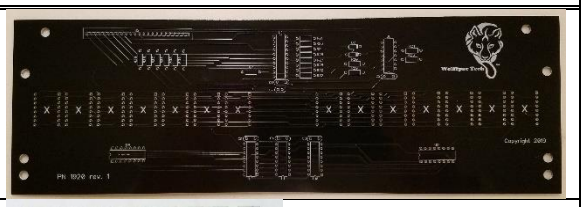
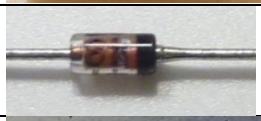
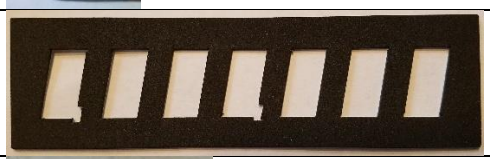
Solder melts at around 400°F to 600°F (200°C to 300°C). Remember to use care when soldering as both the soldering iron and solder are extremely hot and can produce serious burns. Make sure that you use an appropriate work surface since molten solder may drip and hot solder and components may damage or burn many materials.

Eye protection is recommended as solder can splash and component leads may fly when cut.

We are not responsible for any damage or injury as a result of assembling this kit.

Remember: Solder and components will remain very hot for several minutes after soldering.

Parts List:

Part Description	Ref	Qty	
		1	
IC, Marked: ULN2003 Or TBD62003	U4, U5	2	
IC, Marked: CD4042	U1	1	
IC, Marked: 74ACT08	U6	1	
IC, Marked: 74HCT238	U9, U10	2	
IC, Marked: 74ACT573	U2	1	
Diode, Marked 1N4148	D1, D2	2	
Capacitor 100pF, Marked: 100	C7	1	
Capacitor 0.1uF, Marked: 104	C1-C5	5	
14-Segment LED Display	DS	14	
7-digit Foam Bezel		2	
Resistor, 10K Marked: Brown-Black-Black-Red-Brown	R10	1	
Resistor, 20K Marked: Red-Black-Black-Red-Brown	R1-R7	7	

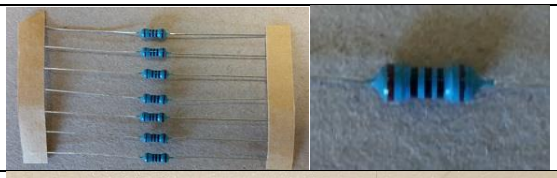
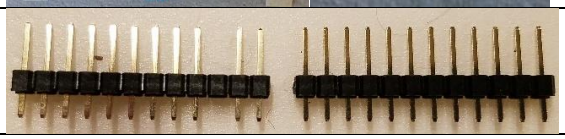
Resistor, See table 1 for value and marking based on the color of the LED digits in your kit:	R20-R31	12	
Male Header, 1x24 Positions Straight (Shipped as 2 pieces)	J2	1	

Table 1, Resistor value (R20-R31)		
LED display color	**Value**	**Marking**
Orange	120 Ohm	Brown-Green-Black-Black-Brown
Red	150 Ohm	Brown-Green-Black-Black-Brown
Blue	100 Ohm	Brown-Black-Black-Black-Brown
Green	150 Ohm	Brown-Black-Black-Black-Brown
White	100 Ohm	Brown-Black-Black-Black-Brown

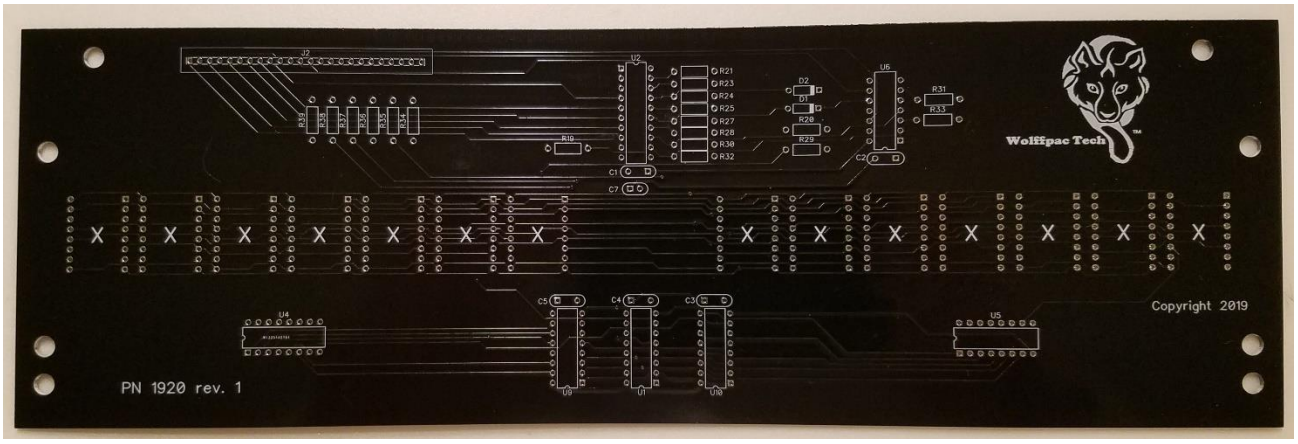
Start Here:

Before starting, check the components received against the parts list on page two. (We do occasionally make mistakes!) If any components are missing, or you have any questions regarding these assembly instructions please contact Wolffpac Tech at 'wolffpactech@gmail.com'.

If you have any problems with the display after assembly, you may contact Wolffpac Tech at 'wolffpactech@gmail.com'. If you need to return the display for repair, we will provide a pre-paid return label. Any problem found to be due to defective components will be repaired free of charge within 1 year of purchase. Any problem found to be due to assembly error or damage will be charged for postage and the cost of any components which need to be replaced.

'Master' Board:

Step 1: Start with the PC Board (marked P/N 1920):



Insert U1 (CD4042) into the board from the top side (the side with the lettering) so that one pin goes through each hole at the location labeled 'U1'. Each chip is marked with a 'U'-shaped notch on one of the short ends:

This end should line up with the notch printed on the PC board. You may find that you have to bend the legs of the chip slightly in order to get both rows to line up with the holes in the board. You can do this with needle nose pliers or by laying the chip on its side with the pins of one side on a hard surface pointing away from you and gently pressing down and away on the body of the chip. Be careful not to bend the pins too far. Once inserted, bend the pins at the corners from the bottom slightly in order to hold the chip in place.

Make sure that all of the pins from the chip are completely inserted through the holes in the board before soldering in place from the bottom.

Step 2. Repeat for U2 (74ACT573)

Step 3. Repeat for U6 (74ACT08)

Step 4. Repeat for U9 and U10 (74HCT238)

Step 5. Repeat for U4 and U5 (ULN2003 or TBD62003).

Step 6: Locate resistor R10 (10K resistors). Bend the leads of the resistor approximately 90° near the body of the resistor so that it forms a 'U' shape. Do not force the bend any closer than it will go with light finger pressure or you may damage the component. Insert the resistor into the board at the position marked R10 on the board. The direction does not matter. The leads should line up easily with the holes on the board. Once inserted through the board, bend the leads slightly from the bottom to hold the resistor against the board. Solder from the bottom. Trim the excess leads from the bottom of the board with diagonal cutters leaving about 1/16 inch.

Step 6: Repeat for R1-R7 (20K resistors).

Step 6: Repeat for R20-R31 (value depends on LED color).

Step 5: Locate diodes D1 and D2. Bend the leads of one diode approximately 90° near the body of the diode so that it forms a 'U' shape. Do not force the bend any closer than it will go with light finger pressure or you may damage the component. Insert the diode into the board at the position marked D1 on the board. The end of the diode marked with a black band must be inserted towards the end marked with a white line on the PC board. Once inserted through the board, bend the leads slightly from the bottom to hold the resistor against the board. Solder from the bottom. Trim the excess leads from the bottom of the board with diagonal cutters leaving about 1/16 inch. Repeat for the remaining diode.

Step 6: Locate capacitor C7 (100 pF capacitor). Insert the capacitor at the positions marked C7 on the board. The direction of these component does not matter. Bend the leads slightly from the bottom of the board to hold in position and solder in place. Trim the excess lead length to about 1/16 inch.

Step 6: Locate capacitors C1 –C5 (100nF capacitor). Insert one capacitor at the positions marked C1 on the board. The direction of these component does not matter. Bend the leads slightly from the bottom of the board to hold in position and solder in place. Trim the excess lead length to about 1/16 inch. Repeat for C2-C5.

Step 7: Locate connector J2. Note that J2 is shipped in two pieces. Insert the connector with the missing pin aligned with the white square printed on the PC board. Solder one pin on each half from the back of the board. Confirm that the connector is fully seated against the board and that the two halves are aligned with each other. If not, reheat the pin while pressing on the connector. Be careful not to get burned; the pin will get **very** hot on the top side of the board! Once the position of the connector is good, solder the remaining pins.

Step 10: 14-Segment LED's. The 14-segment LED's are installed in positions DS1-DS14.

-> Note: The LEDs are installed on the back side of the board and are soldered on the top side of the board. <-

Install one 14-segment LED in each position. Insure that the component is installed with the decimal point ('.') towards the bottom of the board and that all 16 pins are correctly seated in the holes. Lay the board face up and solder one pin in each row on the top side of the board. Inspect to ensure that the LED is seated flush with the PC board. If not, reheat the pin while pressing on the display from the front of the board. Once the LED is correctly seated, solder the remaining pins. Repeat for the remaining 13 LED displays.

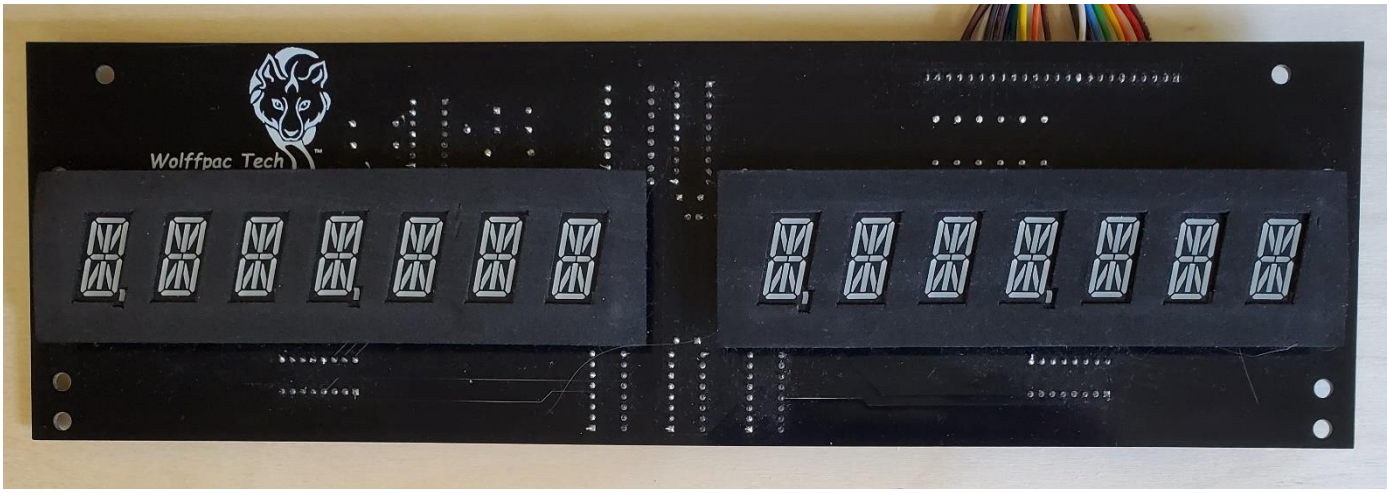
Final Assembly

Step 1. Wipe or rinse the board with Isopropyl Alcohol, Denatured Alcohol, Flux Remover or water depending on the type of solder used to remove the solder flux residue.

Step 2. When the board is completely dry, peel the clear plastic protective film from the front surface of each LED display.

Step 3. Remove the paper backing covering the adhesive from one of the 7-digit foam bezels. Carefully line the openings with the LEDs on the board and Install as shown below.

Note: The adhesive is very aggressive. Be careful when handling the bezel after removing the paper backing to avoid sticking it to something or somewhere you didn't intend!



Step 5. Repeat for the remaining bezel.

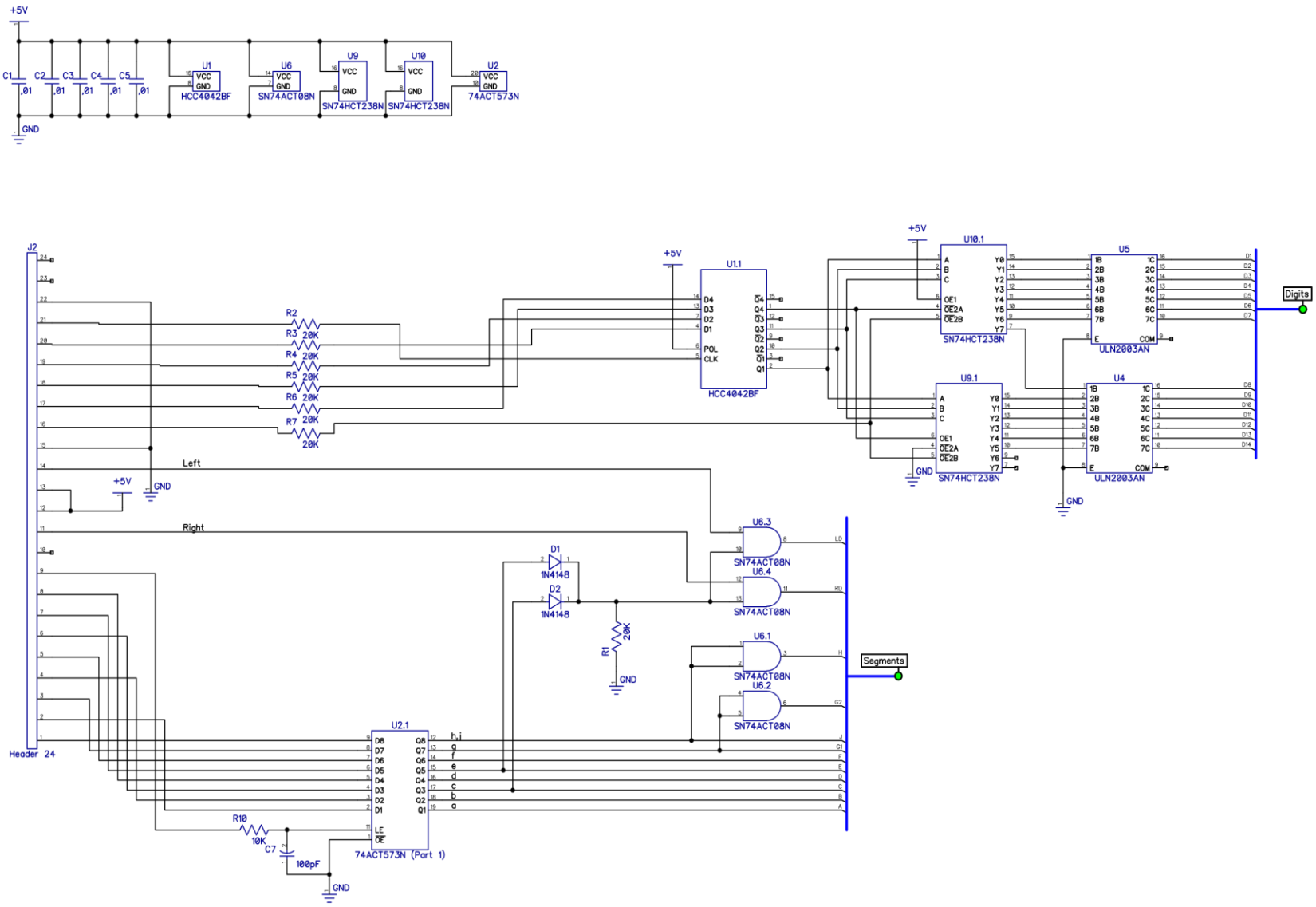
Step 6. With the power off, install the display in your pinball machine and attach the original cables.

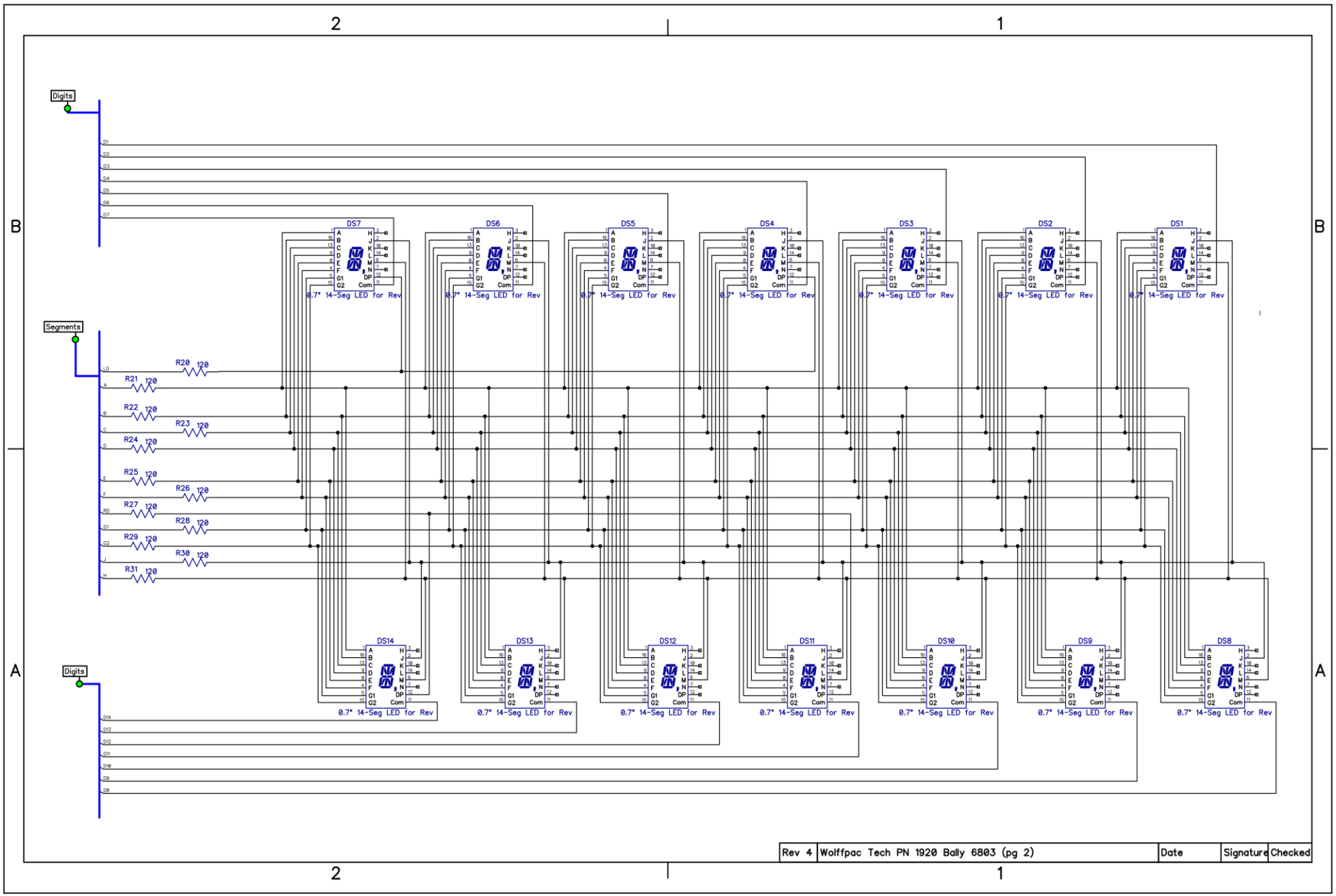
This display can be used along with a second, original display. If both Dual Displays are replaced, the high voltage power supply in your pinball machine is no longer required.

Apply power and enjoy!

This is believed to be an accurate list of machines with displays compatible with this replacement. Since we are unable to test this board in every configuration, we take no responsibility for any errors. However, we do welcome feedback as to any errors that are found so that we can update this list.

Atlantis
Beat the Clock
Black Belt
Blackwater
City Slicker
Dungeons and Dragons
Escape from the Lost World
Hardbody
Heavy Metal Meltdown
Motordome
Party Animal
Ramp Warrior
Special Force
Strange Science
Truck Stop


+5V
C1 .01
C2 .01
C3 .01
C4 .01
C5 .01
GND
U1 HCC4042BF
U6 SN74ACT08N
U9 SN74HCT238N
U10 SN74HCT238N
U2 74ACT573N
J2
Header 24
R2 20K
R3 20K
R4 20K
R5 20K
R6 20K
R7 20K
U1.1 HCC4042BF
U10.1 SN74HCT238N
U9.1 SN74HCT238N
U5 ULN2003AN
U4 ULN2003AN
Digits
Left
Right
U6.3 SN74ACT08N
U6.4 SN74ACT08N
U6.1 SN74ACT08N
U6.2 SN74ACT08N
D1 1N4148
D2 1N4148
R1 20K
Segments
U2.1 74ACT573N (Part 1)
R10 10K
C7 100pF
Rev 4
Wolffpac Tech PN 1920 Bally 6803 (pg 1)
Date
Signature
Checked


2
1
B
A
Digits
Segments
Digits
D1
D2
D3
D4
D5
D6
D7
D14
D13
D12
D11
D10
D9
D8
LD
A
B
C
D
E
F
RD
G1
G2
J
H
R20 120
R21 120
R22 120
R23 120
R24 120
R25 120
R26 120
R27 120
R28 120
R29 120
R30 120
R31 120
DS7
DS6
DS5
DS4
DS3
DS2
DS1
DS14
DS13
DS12
DS11
DS10
DS9
DS8
0.7" 14-Seg LED for Rev
Rev 4
Wolffpac Tech PN 1920 Bally 6803 (pg 2)
Date
Signature
Checked